

**Lawrence Berkeley National Laboratory,  
National Renewable Energy Laboratory,  
Pacific Northwest National Laboratory  
Updated: 19 April 2010**

**Laboratory Issued Guidance for Implementation of Stage-Gate Criteria in the  
Commercial Building Partnership Projects**

Lawrence Berkeley National Laboratory (LBNL), the National Renewable Energy Laboratory (NREL), and Pacific Northwest National Laboratory (PNNL) are jointly issuing this description of the stage gate process for Commercial Building Partnership Projects. The Stage Gates are fundamentally a *risk management process*. Work is conducted in a series of stages and gates. Gates are checkpoints that apply a set of pre-determined criteria, allowing the National Laboratories and Participants to make a deliberate decision whether and under what conditions a project should be allowed to proceed to the next stage of work. The criteria that the National Laboratories intend to use at each stage gate are described in this document. These criteria could change in the future. These criteria were developed in consultation with the Department Energy (DOE).

**Background**

The strategy for achieving DOE's Commercial Building Initiative (CBI) goals of achieving market-ready zero-energy buildings by 2025 and having a significant impact on the energy efficiency of existing buildings relies upon direct engagement with the market through establishment and support of competitively selected Commercial Building Partnership (CBP) projects. The CBP Participants, who design, build, own, and operate commercial buildings, receive technical expertise from DOE's National Laboratory's in the form of technical support from expert teams comprised of laboratory staff and consultants to improve the energy efficiency of their new and existing buildings.

**Definitions**

For clarity, this section defines some of the commonly used terms in this document.

National Laboratory: The National Laboratories are Federally Funded Research and Development Centers (FFRDC) administered, managed, operated, and staffed by private organizations and universities under contract with DOE.

Participant in the Commercial Building Partnerships (Participant): A Participant is an owner, developer, operator, manager, or other entity with a vested interest in a property that has committed to participate and meet project Commercial Building Partnership goals and expectations.

Technical Expert Team: A team of individuals, companies, or other entities that can provide a broad range of technical expertise to Participants in order to meet program goals.

Team Lead: The lead individual, company, or entity for a Technical Expert Team. The Team Lead will be responsible for most interactions with the National Laboratories and with the Participants. The Team

Lead will be responsible for completing deliverables, financial management, and coordinating other team members and will likely be required to have subcontracts or other agreements with other members of the Technical Expert Team.

**M&V Technical Contractor:** An individual, company, or entity that is acting apart from a Technical Expert Team that provides focused expertise in the area of Measurement and Verification (M&V) related to buildings operations.

## Document Overview

This document provides a summary of the methods and criteria that will be used to assess the progress and value of Commercial Building Partnership projects. For the purpose of evaluation, each project will be divided into a series of stages separated by gates, and to proceed through a state gate (i.e., to pass from one stage to another), a project must meet a set of criteria (i.e., requirements). The National Laboratories in collaboration with the DOE will make the determination whether a project has met the criteria for a given stage and whether the project should be allowed to progress to the next stage.

## Project Types and Stages

The Commercial Building Partnerships project includes five types of projects as shown in Table 1.

**Table 1. Participant Project Types and Participant Project Goals**

Type	Project Description	Participant Project Goals
1	Renovation of an existing building	<ol style="list-style-type: none"> <li>1) Achieve 30% or more energy savings relative to either a) the median energy performance of the company's building stock, or b) the median energy performance from the EIA Commercial Building Energy Consumption Survey (CBECS) for a similar building type. Note that the completed retrofit must meet or exceed the energy performance of an equivalent newly constructed, ASHRAE Standard 90.1-2007 compliant building.</li> <li>2) Facilitate deployment by integrating the lessons learned during the design, construction, and operation of the retrofit project into the Participant's retrofit practices</li> </ol>
2	Design and construction of a new building	<ol style="list-style-type: none"> <li>1) Achieve 50% or more energy savings relative to an ASHRAE Standard 90.1-2007 compliant building</li> <li>2) Facilitate deployment by integrating the lessons learned during the design, construction, and operation of the new building into the Participant's new construction practices</li> </ol>
3	Reduction of energy use across an entire portfolio of buildings	<ol style="list-style-type: none"> <li>1) Retrofit of two or more building systems throughout the Participant's building portfolio to achieve significant energy savings portfolio wide. The threshold for energy savings will be determined on a project-by-project basis.</li> </ol>

Type	Project Description	Participant Project Goals
4	Exemplary retrofit project	<ol style="list-style-type: none"> <li>1) Retrofit an existing building or group of buildings (e.g., an existing campus) to achieve a 50% energy savings relative to either a) the median energy performance of the company's building stock, or b) the median energy performance from the EIA Commercial Building Energy Consumption Survey (CBECS) for a similar building type. Note that the completed retrofit must meet or exceed the energy performance of an equivalent newly constructed, ASHRAE Standard 90.1-2007 compliant building(s).</li> <li>2) Facilitate deployment by integrating the lessons learned during the design, construction, and operation of the retrofit project into the Participant's retrofit practices</li> </ol>
5	Exemplary new construction project	<ol style="list-style-type: none"> <li>1) Design, construct, and commission a new building or group of buildings that achieve(s) net-zero energy use according to one or more of the four definitions described in <i>Getting to Net Zero</i> (ASHRAE Journal, September 2009).</li> <li>2) Facilitate deployment by integrating the lessons learned during the design, construction, and operation of the net zero energy building into the Participant's design, construction, and building operation practices</li> </ol>

The five project types can be grouped into two broad categories: large portfolio projects and exemplary projects. Project types 1, 2, and 3 are large portfolio projects. Projects types 4 and 5 are exemplary projects.

The large projects are typically cost-effective, energy efficient, and can often be completed with today's commonly available building technologies. Such projects, because of their attractiveness in terms of both energy efficiency and cost effectiveness, will be prime candidates for deployment throughout a Participant's portfolio and perhaps throughout the sector. Exemplary projects help to develop the foundation for the next generation of commercial buildings by demonstrating what is possible and by helping to create demand for building technologies that may be necessary to meet the next generation of energy savings goals.

Each project will be conducted and evaluated in a series of stages. An overview of the stages is provided below followed by additional information for each stage.

- Stage 0 Commercial Building Partnership Selection: competitive selection process
- Stage 1 Pre-Design Planning: go/no-go on whether to engage in the project
- Stage 2 Design/Redesign: document the decision process
- Stage 3 Construction and Commissioning: go/no-go on whether to monitor the building
- Stage 4 Operating Performance Monitoring: detailed monitoring of building performance
- Stage 5 Deployment: use lessons learned and technologies throughout the firm's portfolio

At the completion of Stages 1, 2, 3, and 4, a technical report will be prepared by the National Laboratories and the Technical Expert Teams. At the completion of each these same stages, Participants are expected to complete commitment letters confirming that they are prepared to move on to the next

stage of work The Stage Gate criteria described in this document are preliminary. DOE and the National Laboratories reserve the right to modify the Stage Gate criteria or process.

## Stage 0: Commercial Building Partnership Participant Selection

The goal of this stage is to quickly approve or deny Commercial Building Partnership projects. The threshold for entry into the process requires that potential Participants show evidence that they meet the criteria listed in the Call for Projects document ([www.nrel.gov/cbp/CallForProjects.pdf](http://www.nrel.gov/cbp/CallForProjects.pdf)). These criteria are meant to demonstrate a willingness to work toward the specified energy efficiency target for their project and to contribute to the overall goal of replicating these efficiencies throughout the commercial building sector. Submitting a proposal and responding to potential follow-up actions fulfill Participant requirements for this stage of work and will provide the information necessary for the National Laboratories to make a decision about continuing on to Stage 1. Local and state government applicants from a jurisdiction with authority to adopt building codes must verify adoption of codes with equivalent or greater energy performance than the latest version of ANSI/ASHRAE/IESNA Standard 90.1.

## Stage 1: Pre-Design Planning

In the pre-design stage, preliminary analyses are conducted by the National Laboratory and Technical Expert Teams to indicate whether the project can meet both the DOE-set energy efficiency and/or net-zero energy targets and the Participant's business criteria. The Participant must also demonstrate a spirit of cooperation and willingness to share information and costs.

**Table 2. Stage-Gate 1 Criteria**

<b>Stage 1 Pre-Design Planning</b>			
<b>#</b>	<b>Criteria</b>	<b>Target</b>	<b>Evidence</b>
1.1	Data Sharing with National Laboratory, Technical Expert Teams and M&V Technical Contractor	Yes	Non-disclosure agreement signed or waived and/or other mechanism in place to share information with the National Laboratory, Technical Expert Team and M&V Technical Contractor assigned to the CBP Participant.
1.2	Baseline data collected	Yes	Energy simulation model of prototypical building or actual project. May include baseline monitoring to establish performance metrics.
1.3	Prototypical plan review completed and the design and construction scheduled	Yes	Design and construction timeline established and documented.
1.4	Projected energy savings are likely to meet CBI energy targets	Yes	A Stage 1 Report showing preliminary analysis (model runs, spreadsheet calculations, or other evidence), verified by a National Laboratory or a Technical Expert Team, that documents the expected energy saving for the project. Letter from the company indicating that the package of preliminary efficiency measures meet their business criteria and are a reasonable basis for going forward.
1.5	Cost sharing demonstrated	Yes	Quarterly cost sharing reports completed and delivered to the National Lab.

1.6	Participant commitment letter	Yes	At the completion of stage 1 Participant provides a commitment letter indicating willingness to move forward to State 2.
-----	-------------------------------	-----	--

It is essential that any Commercial Building Partnership project have evidence to support criteria 1.1, 1.2, and 1.4. Without this evidence, DOE or the National Laboratories will be unable to judge whether to approve the project. The Participant and the National Laboratory along with the Technical Expert Teams must provide this evidence.

## Stage 2: Design/Redesign

Stage 2 is a critical part of the CBP Program. In Stage 2, the CBP Participant will work with the National Laboratories and Technical Expert Teams to conduct a very detailed analysis and design of the new or building retrofit plans to achieve higher levels of efficiency. The ultimate product for DOE is the result of this iterative analysis, which will be documented as a technical report. The report will show the range of options, costs, benefits, and tradeoffs to achieve higher levels of efficiency for a particular building type (and potentially other details such as location, orientation, geometry, etc.).

- Three simulations will be required to complete Stage 2, as follows: A calibrated baseline model showing expected energy performance for the existing building in the case of retrofits or existing design and construction practices in the case of new construction. Examples of current practice and may represent minimum local code requirements or prototype design elements. A simulation demonstrating energy performance if the building just met ASHRAE 90.1, 2007 code requirements.
- A simulation demonstrating building performance with recommended energy efficiency measures incorporated into the design.

Actual design recommendations will include detailed analysis, cost estimates, and construction documentation. The National Laboratories and the Technical Expert Teams will not prepare formal construction documents. Actual design and construction documents are the responsibility of the Participants and their design teams.

**Table 3. Stage-Gate 2 Criteria**

Stage 2 Design/Redesign			
#	Criteria	Target	Evidence
2.1	Modeling studies and design recommendations are complete and findings indicate the project meets CBP goals.	Yes	Stage 2 Report including a list of design recommendations and energy saving features, an analysis of financial performance of the measures, and the expected energy performance found in the three building simulations. It will document limitations related to the modeling tools and how these were overcome. It will document findings of any special studies (e.g., daylighting or refrigeration assessment)

Stage 2 Design/Redesign			
2.3	Final construction documents show substantial energy savings that are commensurate with those stipulated in the project application	Yes	Final construction documents incorporating recommended efficiency measures.
2.4	Monitoring plan approved	Yes	Monitoring plan and approval letter.
2.5	Commissioning plan approved and incorporated into the building budget	Yes	Commissioning plan and approval letter. Company agrees to share commissioning report with the assigned National Laboratory, Technical Expert Team, and M&V Technical Contractor.
2.6	Cost sharing reports received	Yes	Quarterly cost sharing reports completed and delivered to the National Laboratory.
2.7	Project entered into DOE High Performance Building Database	Yes	Data entered.
2.8	Participant commitment letter	Yes	At the completion of stage 2 Participant provides a commitment letter indicating willingness to move forward to State 3.

DOE and the National Laboratories recognize that the final decision of whether or not to proceed with project construction and at what level of efficiency rests with the CBP Participant. Because of either Participant or DOE (National Laboratory) decisions, some projects may not proceed to Stage 3. However, in all cases, any project that enters Stage 2 must have a complete technical report, which is funded by DOE and prepared by the National Laboratory or a Technical Expert Team. The technical report will be peer reviewed to ensure quality and once approved will be publicly available. At the completion of Stage 2, the project will be entered into the DOE High Performance Building Database.

### Stage 3: Construction and Commissioning

The goal for Stage 3 is to quickly determine whether DOE will participate in a measurement and verification (M&V) effort. DOE's primary interests are in how the building actually performs as compared with the design intent. As such, a requirement for passage beyond this stage is evidence that the building equipment was installed and set up properly (this can be achieved through the commissioning agent's report) and that the building was built as designed or, if the design was modified, and whether any changes significantly affect the overall energy performance target. The National Laboratory or a Technical Design Team will model the building as-built to determine consistency with Stage 2 energy efficiency recommendations.

**Table 4. Stage-Gate 3 Criteria**

Stage 3 Construction and Commissioning			
#	Criteria	Target	Evidence
3.1	Construction challenges and solutions documented	Report	Brief report that details any construction issues and their solutions.
3.2	Building as built is consistent with the recommended design	Constructed building as-built	Stage 3 technical report showing an as-built building simulation.

Stage 3 Construction and Commissioning			
		is no more than 5% below the performance target	
3.3	Building commissioned	Yes	Commissioning agent's report.
3.4	The CBP Participant is committed to implementation of the M&V plan and dissemination of data and lessons learned	Yes	CBP Participant letter of commitment to long-term (12 to 24 months) of monitoring and moving forward to stage 4. DOE evaluation that monitored data will provide new information to inform future projects.
3.5	Cost sharing reports received	Yes	Quarterly cost sharing reports completed and delivered to the National Lab.

In Stage 3, DOE will fund the technical report on the “as constructed” building. The report will be peer reviewed to ensure quality. If the simulation shows that the as-built building is no more than 5 percent less efficient than the recommended design from Stage 2, and if the building is commissioned and the M&V plan is adequate, DOE is prepared to proceed with the M&V project. The data should provide new information that can inform future projects of similar scope, including miscellaneous energy loads or business processes.

### Stage 4: Performance Monitoring

In Stage 4, operating performance data will be collected and analyzed by the National Laboratories or the M&V Technical Contractor to produce the final technical report on actual building performance. The National Laboratory will assist the CBP Participant in documenting the business case for constructing and operating a high-efficiency building, and an implementation plan to replicate these practices and results across the Participant's building portfolio. CBP Participants can request continued assistance with portfolio-wide tracking and analysis of projects, leading into Stage 5.

**Table 5. Stage-Gate 4 Criteria**

Stage 4 Performance Monitoring			
#	Criteria	Target	Evidence
4.1	Stage 4 technical report case study complete	Yes	Stage 4 technical report with lessons learned, analysis of one year of actual measured data with comparison against simulation of building performance as built and as designed (Stage 4 technical report).
4.2	Case Study complete	Yes	Case study for public distribution describing lessons learned, technologies employed, financial performance and deployment activities.

<b>Stage 4 Performance Monitoring</b>			
<b>#</b>	<b>Criteria</b>	<b>Target</b>	<b>Evidence</b>
4.2	Business case complete	Yes	Business case with lessons learned. Includes a comparison of the project's actual and expected costs and energy performance. Emphasis on ability to meet business criteria.
4.3	Implementation plan for widespread use of results within the Partner's building portfolio	Yes	Plan including an explanation of acceptable and unacceptable approaches for implementing the results throughout the Partner's building portfolio.
4.4	Participant commitment letter	Yes	At the completion of stage 4 Participant provides a commitment letter indicating willingness to move forward to State 5.

### Stage 5: Deployment

Stage 5 is deployment of the building design and development of lessons learned for the relevant Energy Alliance. CBP Participants can request technical expertise in converting the lessons learned into a concrete plan for deploying low-energy technologies and improved operating procedures throughout their existing building portfolio as well as new building prototypes and specifications. Funding for this support will be dependent on resources available at that point in time.

Large Portfolio Partners with new construction or retrofit projects (project types 1 and 2) are expected to replicate these improvements throughout their portfolios. These improvements should be made as soon as practical given the Partner's standard business criteria for capital investments of this nature.

Exemplary Project Partners, on the other hand, are expected to assist with outreach efforts and promotion of their project by DOE.

### Summary of Peer Reviewed Technical Reports

As a CBP successfully moves through the various stages, formal technical reports are prepared by the National Laboratory and Technical Expert Teams. These reports inform the Program Measurement and Monitoring (PMM) reports that DOE uses to demonstrate progress toward CBP goals. These reports will document the results of achieving target efficiency levels in new and existing buildings of a particular type (e.g., lodging, office, hospital). It is anticipated that, over time, advances in technology and better implementation of design intent will result in increasing levels of efficiency in the DOE-sponsored projects across many building sectors. It is also anticipated that performance may decline as a project advances from one stage to the next. DOE is keenly interested to learn the deliberate and unintentional reasons why such decreases in efficiency occur so as to better inform future efforts. Reports will be completed for Stages 1 through 4. Stage 4 products will also include a case study and a business case intended for public distribution.